What is claimed is:

1. A chemical agent detector for sensing and detecting the presence of a multitude of different chemical agents through the utilization of surface acoustic wave (SAW) sensors by taking an ambient air sample from an environment, the chemical agent detector comprising:

a) a manifold having an air intake port and an air exhaust port through which the ambient air sample can be drawn within the manifold and tested for the presence of the multitude of different chemical agents and then expelled, the ambient air sample drawn within the manifold by a pump connected to the manifold,

b) a plurality of sensor driver boards mounted on the manifold,

c) a plurality of SAW sensors, one each mounted on each sensor driver board such that they are in contact with the ambient air sample drawn within the manifold, each SAW sensor coated with a substance that has an affinity for detecting a particular chemical agent, each SAW sensor and sensor driver board generating its own continuous RF signal which can emit a frequency shift of the continuous RF signal if the particular chemical agent to which the SAW sensor has an affinity for detecting is loaded upon the SAW sensor by the ambient air sample,

d) an RF power tuner and cycler for selectively applying power to the plurality of SAW sensors such that only one SAW sensor is powered-on at a given point in time, the RF power tuner and cycler electrically coupled to the plurality of SAW sensors mounted on the sensor driver boards,

e) an RF multiplexor for receiving the continuous RF signals generated by the SAW sensors and sensor driver boards and for outputting only one of the RF signals at a time based upon which SAW sensor is powered-on at the given point in time, the RF multiplexor electrically coupled to the plurality of sensor driver boards, the RF multiplexor receiving a constant voltage from the RF power tuner and cycler,

f) a microprocessor for interpreting the RF signals generated by the SAW sensors and sensor driver boards and for detecting whether a frequency shift has occurred in any of the generated RF signals which would be indicative of the presence of a particular chemical agent in the ambient air sample drawn within the manifold, the microprocessor electrically coupled to the RF power tuner and cycler and the RF multiplexor, the microprocessor generating a timing signal to the RF power tuner and cycler and the RF multiplexor for instructing the RF power tuner and cycler when and in which order to power-on and power-off each of the plurality of SAW sensors and sensor driver boards such that the RF multiplexor receives and outputs an RF

signal which is generated by only one of the plurality of SAW sensors and sensor driver boards that are turned-on at the given point in time as instructed by the microprocessor, and

g) a power supply including a main power board for providing power to the RF power tuner and cycler, the microprocessor and the pump.

2. The chemical agent detector of Claim 1, further comprising the manifold having a continuous air flow pathway along a longitudinal axis of the manifold connecting the air intake port with the air exhaust port at top and bottom ends respectively of the manifold.

3. The chemical agent detector of Claim 1, further comprising a valve mounted along a top end of the manifold proximal to the air intake port, the valve electrically coupled to the microprocessor for receiving a valve timing signal from the microprocessor, the valve timing signal having a start time and an end time equal to that of the timing signal generated and directed to the RF power tuner and cycler and the RF multiplexor, the valve electrically coupled to the main power board of the power supply.

4. The chemical agent detector of Claim 3, wherein all of the plurality of SAW sensors and sensor driver boards are powered on and off within the period of time that the valve is open and closed.

5. The chemical agent detector of Claim 3, wherein current drivers of the main power board of the power supply are employed to open and close the valve in accordance with the valve timing signal generated by the microprocessor.

6. The chemical agent detector of Claim 3, wherein the valve periodically closes the air intake port temporarily while the pump continues to run to establish a pressure build-up within the manifold to evacuate the ambient air sample present within the manifold out through the air exhaust port.

7. The chemical agent detector of Claim 1, further comprising a plurality of phase shifters, one each for each of the plurality of SAW sensors, each phase shifter tuning one each SAW sensor such that all of the continuous RF signals generated by the SAW sensors and sensor driver boards are of equal value.

8. The chemical agent detector of Claim 7, wherein the plurality of phase shifters receive a constant voltage from the RF power tuner and cycler.

9. The chemical agent detector of Claim 1, wherein the continuous RF signals generated by the SAW sensors and sensor driver boards is 311.5 MHz.

10. The chemical agent detector of Claim 1, further comprising a plurality of amplifiers coupled intermediate the RF power tuner and cycler and the plurality of SAW sensors and sensor driver boards, one amplifier provided for each SAW sensor and

each sensor driver board employed within the detector, the amplifiers assisting the SAW sensors and sensor driver boards in generating the continuous RF signal, the amplifiers receiving a voltage from the RF power tuner and cycler which cycles on and off in accordance with the timing signal generated by the microprocessor and applied to the RF power tuner and cycler.

11. The chemical agent detector of Claim 1, further comprising a down conversion module electrically coupled between the RF multiplexor and the microprocessor for down converting the RF signal outputted from the RF multiplexor before it is directed to the microprocessor, the down conversion module electrically coupled to the main power board of the power supply.

12. The chemical agent detector of Claim 11, wherein the down converted signal is approximately 500 kHz.

13. The chemical agent detector of Claim 11, wherein the down conversion module includes a mixer and a local oscillator, the mixer receiving the RF signal generated by the SAW sensor and sensor driver board that is currently power-on and passed through the RF multiplexor and a constant signal generated by the local oscillator, thereafter subtracting the two received signals to arrive at the down converted signal of which is an output signal of the mixer directed to the microprocessor.

14. The chemical agent detector of Claim 13, wherein the output signal of the mixer will change due to a frequency shift of the RF signal generated by the SAW sensor and sensor driver board in response to a chemical agent being detected by one of the plurality of SAW sensors to which it has an affinity to detect.

15. Te chemical agent detector of Claim 1, wherein the microprocessor is connected to an alarm device for indicating that a chemical agent to which the chemical agent detector is programmed to sense and detect has been detected in the ambient air sample of the environment.

16. The chemical agent detector of Claim 1, wherein each of the plurality of SAW sensors along with one each of the sensor driver boards represents its own oscillator circuit which is electronically isolated from each other SAW sensor and sensor driver board.

17. The chemical agent detector of Claim 1, wherein four sensor driver boards are employed, each sensor driver board having one SAW sensor mounted thereupon.

18. The chemical agent detector of Claim 1, wherein the manifold has a top portion in which are formed a plurality of cavities, one each cavity for one each SAW sensor employed with the chemical agent detector.

19. The chemical agent detector of Claim 18, wherein each cavity includes a top and bottom area, the top area receiving the SAW sensor inserted there within, the bottom area remaining open for receiving a portion of the ambient air sample when drawn within the manifold.

20. The chemical agent detector of Claim 19, further comprising:

a) a plurality of entrance port and exit port sets, one set each for each cavity employed with the chemical agent detector, each entrance port and exit port having proximal and distal ends, all of the proximal ends of each of the entrance ports common to an area within the manifold wherein the ambient air sample has been drawn within the manifold through the air intake port by the pump, and all of the proximal ends of each of the exit ports common to an area within the manifold wherein the ambient air sample has already passed over the SAW sensors, and

b) a barrier wall inserted within the top portion of the manifold separating the entrance port proximal ends from the exit port proximal ends.

21. The chemical agent detector of Claim 20, wherein the distal ends of each entrance and exit port of one set of entrance and exit ports are common to one of the bottom areas of one cavity such that a portion of the ambient air sample can

cross over a SAW sensor and be tested for a particular chemical agent and thereafter be expelled out of the manifold.

22. The chemical agent detector of Claim 1, further comprising:

a) a plurality of attenuators, one each for each sensor driver board employed with the chemical agent detector, each attenuator mounted on each sensor driver board, and

b) a plurality of low pass filters, one each for each sensor driver board employed with the chemical agent detector, each low pass filter mounted on each sensor driver board, the low pass filter ensuring that any harmonics generated above the frequency of the RF signal generated by a SAW sensor and sensor driver board to which the low pass filter is associated with does not interfere with the RF signal.

23. A chemical agent detector having a circuit including surface acoustic wave (SAW) sensors for detecting the presence of varied chemical agents by sampling ambient air of an environment in which the detector is located, the chemical agent detector comprising:

a) a pressure-differential manifold having an air intake port located at a top portion and an air exhaust port located at a bottom portion connected by a continuous air flow pathway formed through the manifold along a longitudinal axis thereof, the manifold further including a pump used to draw the ambient

air into the manifold through the air intake port for testing for the presence of the varied chemical agents and then expelling the tested ambient air out of the manifold through the exhaust port,

b) a plurality of SAW sensor driver boards mounted on the manifold, each SAW sensor driver board having its own SAW sensor mounted thereon such that all SAW sensors come into contact with the ambient air drawn into the manifold by the pump, each SAW sensor coated with a substance that has an affinity for detecting a particular chemical agent, each SAW sensor driver board generating its own continuous RF signal which emits a frequency shift of the continuous RF signal if the particular chemical agent to which the SAW sensor has an affinity for detecting is loaded upon the SAW sensor of a particular SAW sensor driver board by the sample of ambient air,

c) an RF power tuner and cycler for selectively applying a voltage signal to the plurality of SAW sensor driver boards such that only one SAW sensor driver board is powered-on at a given point in time and therefore only one RF signal is being generated at that given point in time, the RF power tuner and cycler electrically coupled to the plurality of SAW sensor driver boards,

d) an RF multiplexor for receiving the continuous RF signals generated by the SAW sensor driver boards and for outputting only one of the RF signals at a time based upon which SAW sensor driver board is powered-on at the given point in time, the RF multiplexor electrically coupled to an output of the plurality of SAW sensor driver boards, the RF multiplexor also electrically coupled to the RF power tuner and cycler and receiving a constant voltage signal therefrom,

e) a microprocessor for interpreting the RF signals generated by the SAW sensor driver boards and for detecting whether a frequency shift has occurred in any of the generated RF signals which would be indicative of the presence of a particular chemical agent in the sample of ambient air drawn within the manifold, the microprocessor electrically coupled to the RF power tuner and cycler and the RF multiplexor, the microprocessor generating a timing signal to the RF power tuner and cycler and the RF multiplexor for instructing the RF power tuner and cycler when and in which order to power-on and power-off each of the plurality of SAW sensor driver boards such that the RF multiplexor receives and outputs an RF signal which is generated by only one of the plurality of SAW sensor driver boards that is turned-on at the given point in time as instructed by the microprocessor,

f) a valve mounted along the top end of the manifold proximal to the air intake port, the valve electrically coupled to the microprocessor for receiving a valve timing signal from the microprocessor, the valve timing signal having a start time and an end time equal to that of the timing signal generated and directed to the RF power tuner and cycler and the RF multiplexor, the valve working in coincidence with the pump such that when the valve is closed a pressure build-up occurs within the manifold as the pump continues to run thereby expelling the sample of ambient air that has been tested out from the manifold through the exhaust port, and

g) a power supply including a main power board for providing power to the RF power tuner and cycler, the microprocessor, the valve and the pump.

24. The chemical agent detector of Claim 23, further comprising a plurality of phase shifters, one each for each of the plurality of SAW sensor driver boards, each phase shifter tuning one SAW sensor such that all of the continuous RF signals generated by the SAW sensor driver boards have an equal value, the plurality of phase shifters electrically coupled to the RF power tuner and cycler and receiving a constant voltage therefrom.

25. The chemical agent detector of Claim 23, further comprising a plurality of amplifiers coupled intermediate the RF power tuner and cycler and the plurality of SAW sensor driver boards, one amplifier provided for each SAW sensor driver board employed within the detector, the amplifiers assisting the SAW sensor driver boards in generating the continuous RF signal, the amplifiers receiving a cycling voltage from the RF power tuner and cycler in accordance with the timing signal generated by the microprocessor and applied to the RF power tuner and cycler.

26. The chemical agent detector of Claim 23, further comprising a down conversion module electrically coupled between the RF multiplexor and the microprocessor for down converting the RF signal outputted from the RF multiplexor before it is directed to the microprocessor, the down conversion module including a mixer and a local oscillator, the mixer receiving the RF signal generated by the SAW sensor driver board that is currently powered-on and passing through the RF multiplexor and a constant RF signal generated by the local oscillator, thereafter subtracting the two received RF signals to arrive at the down converted RF signal of which is an output signal of the mixer and is directed to the microprocessor, the down conversion module electrically coupled to the main power board of the power supply.

27. The chemical agent detector of Claim 26, wherein the output signal of the mixer will change due to a frequency shift of the RF signal generated by the SAW sensor driver board in response to a chemical agent being detected by one of the plurality of SAW sensors to which it has an affinity to detect.

28. The chemical agent detector of Claim 23, wherein the manifold has a plurality of cavities formed in the top portion, one cavity for each SAW sensor employed with the chemical agent detector, each cavity including a top and bottom area, the top area receiving the SAW sensor of a SAW sensor driver board inserted there within, the bottom area remaining open for receiving a portion of the sample of ambient air drawn within the manifold by the pump.

29. The chemical agent detector of Claim 23, further comprising:

a) one entrance port and exit port set for each cavity formed in the manifold top portion, each entrance port and exit port set having proximal and distal ends, all of the proximal ends of all of the entrance ports common to an area within the manifold wherein the sample of ambient air has been drawn within the manifold through the air intake port by the pump, and all of the proximal ends of all of the exit ports common to an area within the manifold wherein the sample of ambient air has passed over the SAW sensors of the SAW sensor driver

boards, and

b) a barrier wall inserted within the top portion of the manifold separating all of the entrance port proximal ends from all of the exit port proximal ends.

30. The chemical agent detector of Claim 29, wherein the distal ends of each entrance and exit port set are common to one of the bottom areas of one cavity such that a portion of the sample of ambient air crosses over a SAW sensor of a SAW sensor driver board and is tested for a particular chemical agent and thereafter expelled down through the continuous air flow pathway and out of the exhaust port of the manifold.

31. The chemical agent detector of Claim 23, further comprising:

a) a plurality of attenuators, one for each SAW sensor driver board and mounted thereupon, and

b) a plurality of low pass filters, one for each SAW sensor driver board and mounted thereupon, the low pass filter of each SAW sensor driver board ensuring that any harmonics generated above the frequency of the RF signal generated by the SAW sensor driver board does not interfere with the RF signal generated by the SAW sensor driver board.